

Syllabus and Scheme of Examination
for
B.A. / B.Sc. (Non Honours) Information Technology

Submitted to

Dibrugarh University, Dibrugarh

Under

Choice Based Credit System

June 2019

CHOICE BASED CREDIT SYSTEM

**B.A. / B.Sc. NON HONOURS
WITH
INFORMATION TECHNOLOGY**

Course Structure

Details of courses under B.A. / B.Sc. Program with Information Technology

Course	*Credits Theory+ Practical	Theory + Tutorial
I. Core Course		
(12 Papers)	12X4= 48	12X5=60
04 Courses from each of the 03 disciplines of choice		
Core Course Practical / Tutorial*		
(12 Practical/ Tutorials*)	12X2=24	12X1=12
04 Courses from each of the 03 disciplines of choice		
II. Elective Course		
(6 Papers)	6X4=24	6X5=30
Two papers from each discipline of choice including paper of interdisciplinary nature		
Elective Course Practical / Tutorials*	6 X 2=12	6X1=6
(6 Practicals / Tutorials*)		
Two papers from each discipline of choice including paper of interdisciplinary nature		
• Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester		
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory Courses (AECC)		
(2 Papers of 2 credit each)	2 X 2=4	2 X 2=4
Environmental Science		
English/MIL Communication		
2. Skill Enhancement Courses (SEC)		
(Minimum 2)	4 X 2=8	4 X 2=8
(4 Papers of 2 credit each)		
Total credit	120	120

* wherever there is a practical there will be no tutorial and vice-versa

**SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.A. /B. Sc. Information Technology (NON-HONOURS)**

Semester	Core Course (12) (6 Credits each)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific Elective (DSE) (4)
I	Information Systems	(English / MIL Communication / Environmental Science)		
	DSC – 2A			
	DSC – 3A			
II	Operating System	(Environmental Science / English / MIL Communication)		
	DSC – 2B			
	DSC – 3B			
III	Computer System Security		SEC – 1	
	DSC – 2C			
	DSC – 3C			
IV	Web Technology		SEC – 2	
	DSC – 2D			
	DSC – 3D			
V			SEC – 3	DSE – 1A
				DSE – 2A
				DSE – 3A
VI			SEC – 4	DSE – 1B
				DSE – 2B
				DSE – 3B

Semester	Course Opted	Course Name	Credits
I	Ability Enhancement Compulsory Course-I	English/MIL communications/ Environmental Science	2
	Core course-I	Information Systems	6
	Core course-II	DSC 2A	6
	Core Course-III	DSC 3A	6
II	Ability Enhancement Compulsory Course-II	English/MIL communications/ Environmental Science	2
	Core course-IV	Operating System	4
	Core Course-II Practical/Tutorial	Operating System Lab	2
	Core course-V	DSC 2B	6
	Core Course-VI	DSC 3B	6
III	Core course-VII	Computer System Security	6
	Core course-VIII	DSC 2C	6
	Core course-IX	DSC 3C	6
	Skill Enhancement Course -1	SEC-1	2
IV	Core course-X	Web Technology	4
	Core Course-X Practical/Tutorial	Web Technology Lab	2
	Core course-XI	DSC 2D	6
	Core course-XII	DSC 3D	6
	Skill Enhancement Course -2	SEC-2	2
V	Skill Enhancement Course -3	SEC-3	2
	Discipline Specific Elective -1	DSE-1A	6
	Discipline Specific Elective -2	DSE-2A	6
	Discipline Specific Elective -3	DSE-3A	6
VI	Skill Enhancement Course -4	SEC-4	2
	Discipline Specific Elective -4	DSE-1B	6
	Discipline Specific Elective -5	DSE-2B	6
	Discipline Specific Elective -6	DSE-3B	6
Total Credits			120

Core Papers: Computer Science (Credit: 06 each) (1 period / week for tutorials or 4 periods / week of practical)

1. Information Systems (5 +1 Tutorial)
2. Operating System (4 + 4 Lab)
3. Computer System Security (5 +1 Tutorial)
4. Web Technology (4 + 4 Lab)

Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1)

Choose Any 1:

1. Programming in JAVA (4 + 4 Lab)
2. Analysis of Algorithm and Data Structures (4 + 4 Lab)

Discipline Specific Elective Papers: (Credit: 06 each) (DSE -2)

Choose Any 1:

1. Database Management Systems (4 + 4 Lab)
2. Computer Graphics (4 + 4 Lab)
3. Computer Networks (4 + 4 Lab)

Skill Enhancement Courses (any four) (Credit: 02 each) – SEC1 to SEC4

Choose 4.

1. Office Automation Tools (1+2 Lab)
2. HTML Programming (1+2 Lab)
3. MySQL (SQL/PL-SQL) (1+2 Lab)
4. Multimedia and Applications (1+2 Lab)
5. PHP Programming (1+2 Lab)
6. Programming in Visual Basic/GAMBAS (1+2 Lab)
7. System Administration and Maintenance (1+2 Lab)
8. Programming in SCILAB (1+2 Lab)
9. Software Testing Concepts (1+2 Lab)
10. Android Programming (1+2 Lab)
11. XML Programming (1+2 Lab)
12. R Programming (1+2 Lab)

Core papers:

Core Paper I : Semester –I:

DSC-1A

1. Information Systems

Information concepts, system & modeling concepts, what is information system, business information system, system development, need to learn information system, organization & information system, competitive advantage, performance based information system, careers in information systems. (8L)

H/W: Component, processing & memory devices, secondary storage, input and output devices

S/W: Overview of S/W, system & application S/W, programming languages, S/W issues & trends (8L)

Data management, data modeling and database models, database management systems, database applications (8L)

Overview of Communication systems, telecommunication, network & distributed processing, telecommunication & application, Use & functioning of the Internet, Internet services, WWW, intranet (18 L)

Introduction to E-Commerce, types of e-commerce, e-commerce, e-commerce application, Electronics Payment System, technologically infrastructure of E-Commerce, trends to E-Commerce, strategy for successful E-Commerce (18 L)

Books:

1. Principal of Information System: Ralph Stair (Thomson course technology)

Core Paper II : Semester –II:

DSC-2A

2. Operating Systems

Introduction: System Software, Resource Abstraction, OS strategies. (2L)

Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems. (2L)

Operating System Organization: Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services – system calls and system programs. (10L)

Process Management : System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model (15L)

Scheduling: Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies. (12L)

Memory Management: Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory (12L)

Shell introduction and Shell Scripting (7L)

- What is shell and various type of shell, Various editors present in linux
- Different modes of operation in vi editor
- What is shell script, Writing and executing the shell script
- Shell variable (user defined and system variables)
- System calls, Using system calls
- Pipes and Filters
- Decision making in Shell Scripts (If else, switch), Loops in shell
- Functions
- Utility programs (cut, paste, join, tr , uniq utilities)
- Pattern matching utility (grep)

Books Recommended:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles , 5th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

Software Lab based on Operating Systems

Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands:
ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands:
cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands:
chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify “cal” command to display calendars of the specified months.
6. Write a shell script to modify “cal” command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – “Entered login name is invalid”.
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of “who” command along with the total number of users .
10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
14. Write a shell script to find the LCD(least common divisor) of two numbers.
15. Write a shell script to perform the tasks of basic calculator.

16. Write a shell script to find the power of a given number.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Program to show the pyramid of special character “*”.

Core Paper III : Semester –III:
DSC-3A

3. Computer System Security

Introduction to Information Security- The need for Security, Principles of security - confidentiality, Authentications, Integrity, Non-repudiation, Types of attacks- Passive attacks, Active attacks, Virus, Worm, Trojan horse. Introduction to Cryptography, Secret Sharing. (8 L)

Symmetric Key Encipherment:- Traditional symmetric Key Ciphers: Introduction- Kirchhoff's principle, cryptanalysis, categories of traditional ciphers; Substitution Ciphers - monoalphabetic ciphers, polyalphabetic ciphers; Transposition Ciphers - keyless and keyed transposition ciphers, Stream and Block Ciphers - stream ciphers, block ciphers. (16 L)

DES(Data Encryption Standard):- Introduction, DES Structure - initial and final permutations, rounds, cipher and reverse cipher, examples; DES Analysis - properties, design criteria, DES weaknesses; Multiple DES - double DES, triple DES; Security of DES - brute-force attack, differential cryptanalysis, linear cryptanalysis. (16 L)

Public key Cryptosystem: Principles of Public Key Cryptosystems- Public Key Cryptosystem, Applications of Key Cryptosystems, Requirement for Public Key Cryptosystem, Public Key Cryptanalysis. RSA Algorithm – Description of the Algorithm, Computational Aspects, Security of RSA (10 L)

Digital Signature:- Comparison- inclusion, verification method, relationship, duplicity; Process- needs for keys, signing the digest; Service- message authentication, message integrity, non-repudiation, confidentiality; Attacks on Digital Signature- attack types; Digital Signature Schemes- RSA digital signature schemes. (10 L)

Books:

1. Cryptography and Network Security Principles and Practices, William Stallings, Pearson Education (For Unit - IV).
2. Cryptography and Network Security”, Behrouz A Forouzan, Tata McGraw-Hill Publishing Company Limited, Special Indian Edition 2007. (For Unit - I, II, III, V).
3. Fundamentals of computer security, Josef Pieprzyk, Thomas hardjino and Jennifer Seberry, Springer International Edition 2008.

Core Paper IV : Semester –IV:
DSC-4A

4. Web Technology

Computer Networks Basics: Topologies, Protocols, Layers in Networks, Switching in Networks, Network Devices, Types of Networks, Concept of IP address, Domain Names. (8L)

Internet Basics: ISP, Connectivity types, WWW, URL, Email, File Transfer, Telnet, Internet Chat. (6L)

Web server and proxy server, Types of Proxy servers, Web browsers, search engines, robots, spiders, web caches, Cookies (10L)

Web Designing, HTML programming basics, Syntax and rules, Cascading Style Sheets, Microsoft Frontpage (12L)

Dynamic functionality in web Pages, CGI, JavaScript, ASP, Introduction to ASP.NET (12L)

Books:

1. Internet and Web Technologies – Raj Kamal – TATA McGraw Hill
2. HTML-Definitive Guide O'reilley
3. Javascript-Definitive Guide O'reilley

Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1)

Options for Discipline Specific Elective Papers, choose one:

1. Programming in JAVA (4 + 4 Lab)

2. Analysis of Algorithm and Data Structures (4 + 4 Lab)

1. Programming in Java

Introduction to Java: Features of Java, JDK Environment (1L)

Object Oriented Programming Concept Overview of Programming, Paradigm, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C++ and JAVA (10L)

Java Programming Fundamental: Structure of java program, Data types, Variables, Operators, Keywords, Naming Convention, Decision Making (if, switch), Looping (for, while) ,Type Casting (10L)

Classes and Objects: Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance, Implementation of Polymorphism, Method Overloading, Method Overriding, Nested and Inner classes (10L)

Arrays and Strings: Arrays, Creating an array, Types of Arrays, String class Methods, String

Buffer methods. (6L)

Abstract Class, Interface and Packages: Modifiers and Access Control, Abstract classes and methods, Interfaces, Packages Concept, Creating user defined packages (8L)

Exception Handling: Exception types, Using try catch and multiple catch, Nested try, throw, throws and finally, Creating User defined Exceptions. (4L)

File Handling: Byte Stream, Character Stream, File IO Basics, File Operations, Creating file, Reading file, Writing File (5L)

Applet Programming: Introduction, Types Applet, Applet Life cycle, Creating Applet, Applet tag (6L)

Books Recommended:

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. E Balagurusamy , Programming with JAVA, TMH, 2007

Software Lab based on Java

1. WAP to find the largest of n natural numbers.
2. WAP to find whether a given number is prime or not.
3. Write a menu driven program for following:
 - a. Display a Fibonacci series
 - b. Compute Factorial of a number
 - c. WAP to check whether a given number is odd or even.
 - d. WAP to check whether a given string is palindrome or not.
4. WAP to print the sum and product of digits of an Integer and reverse the Integer.
5. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
6. Write a program that will prompt the user for a list of 5 prices. Compute the average of the prices and find out all the prices that are higher than the calculated average.
7. Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set.
8. Write java program for the following matrix operations:
 - a. Addition of two matrices
 - b. Summation of two matrices
 - c. Transpose of a matrix
 - d. Input the elements of matrices from user.
9. Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.
10. Write a Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.
11. Write a java program to create a frame window in an Applet. Display your name, address and qualification in the frame window.
12. Write a java program to draw a line between two coordinates in a window.
13. Write a java program to display the following graphics in an applet window.

- a. Rectangles
 - b. Circles
 - c. Ellipses
 - d. Arcs
 - e. Polygons
14. Write a program that reads two integer numbers for the variables a and b. If any other character except number (0-9) is entered then the error is caught by NumberFormatException object. After that ex.getMessage() prints the information about the error occurring causes.
15. Write a program for the following string operations:
- a. Compare two strings
 - b. Concatenate two strings
 - c. Compute length of a string
16. Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception.

2. Analysis of Algorithm and Data Structures

Introduction: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm (4L)

Algorithm Design Techniques: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms. (6L)

Sorting Techniques: Elementary sorting techniques-Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques-Heap Sort, Quick Sort, Sorting in Linear Time-Bucket Sort, Radix Sort and Count Sort (10L)

Searching Techniques: Linear and Binary search. (4L)

Complexity Analysis: Medians & Order Statistics. (4L)

Data Structures:

1. Arrays (4 Lectures)

Single and Multi-dimensional Arrays, Sparse Matrices

2. Stacks (5 Lectures)

Implementing stack using array and linked list, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another;

3. Queues (5 Lectures)

Array and Linked representation of Queue, De-queue, Priority Queues

4. Linked Lists (5 Lectures)

Singly, Doubly and Circular Lists, representation of Stack and Queue as Linked Lists.

5. Recursion (5 lectures)

Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion;

6. Trees (5 Lectures)

Introduction to Tree as a data structure; Binary Trees, Binary Search Tree, (Creation, and Traversals of Binary Search Trees)

Recommended Books:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein-Introduction to Algorithms, PHI, 3rd Edition 2009.
2. Sarabasse & A.V. Gelder Computer Algorithm –Introduction to Design and Analysis, Publisher–Pearson 3rd Edition 1999.
3. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
4. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
5. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++", Second edition, PHI, 2009.
6. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
7. D.S Malik, Data Structure using C++, Second edition, Cengage Learning, 2010.

Software Lab based on Analysis of Algorithms:

1. Implement Insertion Sort (The program should report the number of comparisons)
2. Implement Merge Sort (The program should report the number of comparisons)
3. Implement Heap Sort (The program should report the number of comparisons)
4. Implement Randomized Quick sort (The program should report the number of comparisons)
5. Implement Radix Sort.
6. Implement Searching Techniques
7. Implementation of Recursive function.
8. Array and Linked list implementation of Stack and Queue.
9. Implementation of Single, Double and circular Linked List
10. Creation and traversal of Binary Search Tree.

Discipline Specific Elective Papers: (Credit: 06 each) (DSE-2)

Options for Discipline Specific Elective Papers, choose one:

1. Database Management Systems (4 + 4 Lab)
2. Computer Graphics (4 + 4 Lab)
3. Computer Networks (4 + 4 Lab)

1. Database Management Systems

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence. (10L)

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99: Schema Definition, constraints, and object modeling. (15L)

Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries. (15L)

Database design: ER and EER to relational mapping, functional dependencies, normal forms up to third normal form. (20 L)

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishnan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill,

2002.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

Software Lab based on Database Management Systems

Note: MyAccess/MySQL may be used.

The following concepts must be introduced to the students:

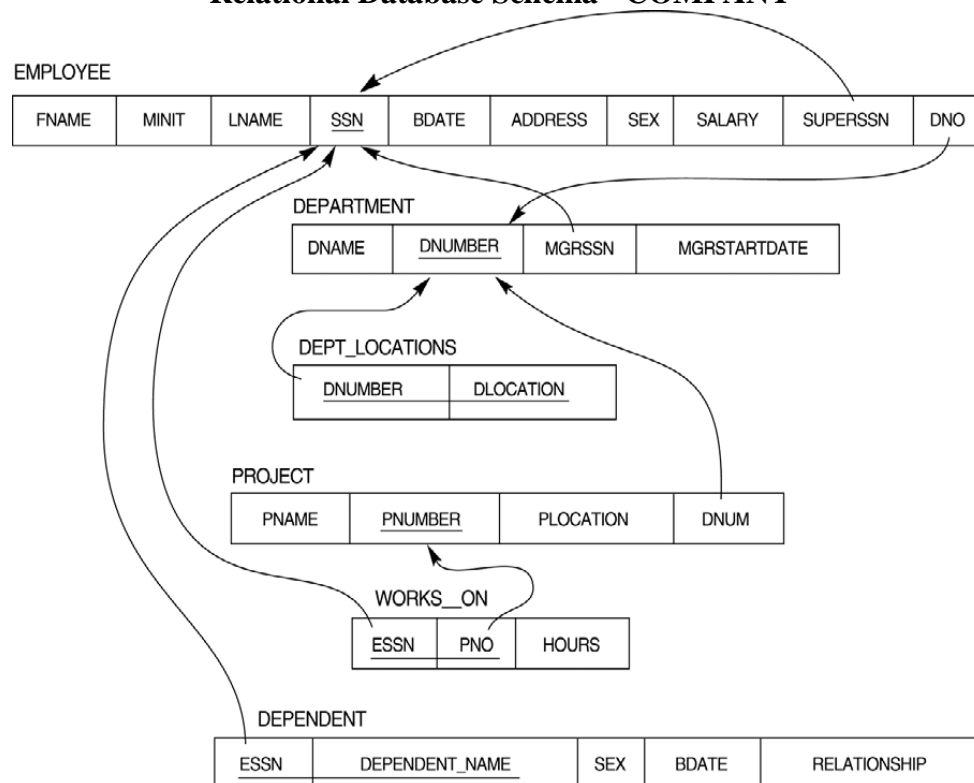
DDL Commands

- Create table, alter table, drop table

DML Commands

- Select , update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or, not, =, <>, >, <, >=, <=)
- Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by.....having
- Arranging using order by

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
 1. Display all the details of all employees working in the company.

2. Display ssn, lname, fname, address of employees who work in department no 7.
3. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'
4. Retrieve the name and salary of every employee
5. Retrieve all distinct salary values
6. Retrieve all employee names whose address is in 'Bellaire'
7. Retrieve all employees who were born during the 1950s
8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
9. Retrieve the names of all employees who do not have supervisors
10. Retrieve SSN and department name for all employees
11. Retrieve the name and address of all employees who work for the 'Research' department
12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.
13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
14. Retrieve all combinations of Employee Name and Department Name
15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
16. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
17. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
18. Select the names of employees whose salary does not match with salary of any employee in department 10.
19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
22. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
24. For each department, retrieve the department number, the number of employees in the department, and their average salary.
25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.

26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
29. Delete all dependents of employee whose ssn is '123456789'.
30. Delete an employee from Employee table with ssn = '12345' (make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL
31. Perform a query using alter command to drop/add field and a constraint in Employee table.

2. Computer Graphics

Introduction, Overview of Graphics Systems, Display devices, Input devices, Hard-Copy devices, Graphics software. (12L)

Line Drawing Algorithms-DDA, Bresenham, Circle Generating Algorithm – Midpoint Algorithm, Area filling algorithms – Flood Fill and Boundary Fill algorithms. (12L)

Output primitives-Color and Grayscale levels, 2D Transformations - Translation, Rotation, Scaling, Reflection, Shear, Matrix Representation and Homogenous Coordinates, Composite Transformations. (12L)

Two Dimensional viewing, Window-to-viewport Transformation, Clipping - Point Clipping, Line Clipping – Cohen Sutherland Algorithm, Polygon Clipping – Sutherland Hodgeman Algorithm, Text clipping. (12L)

List of Practical for Computer Graphics to be implemented in C programming language:

1. Implementation of Line Drawing algorithms
2. Implementation of Scan-Line Polygon Fill Algorithm
3. Implementation of Circle Drawing Algorithm
4. Implementation of Ellipse Drawing Algorithm
5. Implementation of 2D Transformations
6. Implementation of Line Clipping Algorithms
7. Implementation of Polygon Clipping, character and text Clipping Algorithm
8. Implementation of 3D Transformations
9. Implementation of Character Generation
10. Implementation of Bezier curves, B-Spline Curves
11. Implementation of Visible Surface methods
12. Implementation of Shading Algorithms
13. Drawing a Smiley using Fractals

Recommended Book:

1. Donald Hearn and M. Pauline Baker, "Computer Graphics-C Version", Second Edition, Pearson Education, 2005.

References

1. Foley, Van Dam, Feiner, Huges, "Computer Graphics: Principles & Practice", Second edition in C, Pearson Education, 2005
2. Ranjan Parekh, "Principles of Multimedia", Tata McGrawHill, 2006
3. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
4. "Procedural elements of Computer Graphics", Rogers, McGraw Hill.
5. "Mathematical elements of Computer Graphics", Rogers, McGraw Hill.
6. Steven Harrington, "Computer Graphics- A Programming Approach", Second Edition, McGrawHill International.

3. Computer Networks

Basic concepts : Components of data communication, standards and organizations, Network Classification, Network Topologies ; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite. (16L)

Physical Layer : Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway. (6L)

Data Link Layer : Framing techniques; Error Control; Flow Control Protocols; Shared media protocols - CSMA/CD and CSMA/CA. (8L)

Network Layer : Virtual Circuits and Datagram approach, IP addressing methods – Subnetting; Routing Algorithms (adaptive and non-adaptive) (8L)

Transport Layer: Transport services, Transport Layer protocol of TCP and UDP (6L)

Application Layer : Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP (10L)

Network Security : Common Terms, Firewalls, Virtual Private Networks (6L)

Books Recommended:

1. B.A. Forouzan: Data Communication and Networking, 4th Edition, Tata McGraw Hill, 2007.
2. D.E. Comer, Internetworking with TCP/IP, Vol. I, Prentice Hall of India, 1998.
3. W. Stalling, Data & Computer Communication, 8th edition, Prentice Hall of India, 2006.
4. D. Bertsekas, R. Gallager, Data Networks, 2nd edition, Prentice Hall of India, 1992.

Software Lab based on Computer Networks:

Implement the concepts of Computer Networks such as:

1. Simulate Checksum Algorithm.
2. Simulate CRC Algorithm
3. Simulate Stop & Wait Protocol.
4. Simulate Go-Back-N Protocol.
5. Simulate Selective Repeat Protocol and so on....

Skill Enhancement Courses (Choose any four)

(Credit: 02 each) – SEC1 to SEC4

Theory: 01, Labs: 02

Options for Skill Enhancement Courses, Choose any four

- | | |
|--|-----------|
| 1. Office Automation Tools | (1+2 Lab) |
| 2. HTML Programming | (1+2 Lab) |
| 3. MySQL (SQL/PL-SQL) | (1+2 Lab) |
| 4. Multimedia and Applications | (1+2 Lab) |
| 5. PHP Programming | (1+2 Lab) |
| 6. Programming in Visual Basic/GAMBAS | (1+2 Lab) |
| 7. System Administration and Maintenance | (1+2 Lab) |
| 8. Programming in SCILAB | (1+2 Lab) |
| 9. Software Testing Concepts | (1+2 Lab) |
| 10. Android Programming | (1+2 Lab) |
| 11. XML Programming | (1+2 Lab) |
| 12. R Programming | (1+2 Lab) |

Note: Universities may include more options or delete some from this list

Detailed Syllabus:

1. Office Automation Tools

Introduction to open office/MS office/Libre office (2L)

Word Processing: Formatting Text, Pages, Lists, Tables (5L)

Spreadsheets: Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table (6L)

Presentation Tools: Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations (4L)

Books Recommended:

1. Sushila Madan , Introduction to Essential tools,JBA,2009.
2. Anita Goel, Computer Fundamentals, Pearson, 2012

Computer Lab Based on Office Automation:

Practical List for WORD:

1. Create a **telephone directory**.

- The heading should be 16-point Arial Font in bold
- The rest of the document should use 10-point font size
- Other headings should use 10-point Courier New Font.
- The footer should show the page number as well as the date last updated.

2. Design a time-table form for your college.

- The first line should mention the name of the college in 16-point Arial Font and should be bold.
- The second line should give the course name/teacher's name and the department in 14-point Arial.
- Leave a gap of 12-points.
- The rest of the document should use 10-point Times New Roman font.
- The footer should contain your specifications as the designer and date of creation.

3. Create the following one page documents.

(a) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.

(b) Design a certificate in landscape orientation with a border around the document.

4. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.

5. Convert following text to a table, using comma as delimiter

Type the following as shown (do not bold).

Color, Style, Item

Blue, A980, Van

Red, X023, Car

Green, YL724, Truck

Name, Age, Sex

Bob, 23, M

Linda, 46, F

Tom, 29, M

6. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.

- Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
- The headings of the columns should be in 12-point and bold.
- The rest of the document should be in 10-point Times New Roman.

- Leave a gap of 12-points after the title.
- XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
 - The title of the book should appear in bold using 20-point Arial font.
 - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
 - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
 - The details of the offices of the publisher (only location) should appear in the footer.
 - Create the following one page documents.
 - Design a Garage Sale sign.
 - Make a sign outlining your rules for your bedroom at home, using a numbered list.
 - Enter the following data into a table given on the next page.

Salesperson	Dolls	Trucks	Puzzles
Amit	1327	1423	1193
Shivi	1421	3863	2934
Om	5214	3247	5467
Ananya	2190	1278	1928
Anupama	1201	2528	1203
Maharshi	4098	3079	2067

Add a column Region (values: S, N, N, S, S, S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

Practical List for EXCEL

- Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:-
 - Copy/Paste
 - Embedding
 - Linking
- The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4th worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4th worksheet should contain college name as the first line. Make it bold, italic and center it.
- Using a simple pendulum, plot 1-T and 1-T² graph.

I	t1	t2	t3	Mean(t)	T=t/20	T ²
70						

80						
90						
100						

Q4. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA	PF	Gross	Net	(VA) Vehicle Allowance

HRA is calculated as follows:

Grade HRA %(of Basic)

1 40%

2 35%

3 30%

Gross = Basic + HRA + VA

Net = Gross –PF

PF is 8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

- Find max, min and average salary of employees in respective Grade
- Count no. of people where VA>HRA
- Find out most frequently occurring grade.
- Extract records where employee name starts with “A” has HRA>10000
- Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.
- Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

Q5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increase the sell of more of more items and getting the profit of Rs40,000/. Use Goal Seek to find out how many items you will have to sell to meet your profit figure.

Q6. To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P – V and P-I/V. Sample observations are:-

Pressure(P)	Volume (V)	I/V	PV	P/V
75	20			
78.9	19			
83.3	18			
88.2	17			

Q7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

Q8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in

Rs.

Salesman	2002	2003	2004	2005
MOHAN	10000	12000	20000	50000
MITRA	15000	18000	50000	60000
SHIKHA	20000	22000	70000	70000
ROHIT	30000	30000	100000	80000
MANGLA	40000	45000	125000	90000

Apply the following Mathematical & Statistical functions:

- Calculate the commission for each salesman under the condition :-
 - If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.
 - Otherwise, 4% of total sale.
- Calculate the maximum sale made by each salesman.
- Calculate the maximum sale made in each year.
- Calculate the minimum sale made by each salesman.
- Calculate the minimum sale made in each year.
- Count the no. of sales persons.
- Calculate the cube of sales made by Mohan in the year 2002.
- Find the difference in sales by salesman Mitra between the year 2002 and 2003.
Find the absolute value of difference.
- Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.
- Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise

Q9. The following table gives an year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

- Calculate total sale year wise.
- Calculate the net sales made by each salesman
- Calculate the commission for each salesman under the condition :-
 - If total sales is greater than Rs. 4, 00,000/-, then commission is 5% of total sale made by the salesman.
 - Otherwise, 2% of total sale.
- Calculate the maximum sale made by each salesman.
- Calculate the maximum sale made in each year.
- Draw a bar graph representing the sale made by each salesman.
- Draw a pie graph representing the sale made by salesmen in year 2001.

Q10. Consider the following worksheet for APS 1st year students:-

S.No.	Name	PH	CH	BY	MT	CS	Total Marks	%	Grade
1									
2									

Grade is calculated as follows:-

If % ≥ 90 Grade A

If % ≥ 80 & < 90 Grade B

If % ≥ 70 & < 80 Grade C

If % ≥ 60 & < 70 Grade D

Otherwise students will be declared fail.

- i) Calculate Grade using if function
- ii) Sort the data according to total marks
- iii) Apply filter to display the marks of the students having more than 65% marks.
- iv) Draw a pie chart showing % marks scored in each subject by the topper of the class.
- v) Draw the doughnut chart of the data as in (iv)
- vi) Enter the S.No. of a student and find out the Grade of the student using VLOOKUP.
- vii) Extract all records where name
 - a) Begins with "A"
 - b) Contains "A"
 - c) Ends with "A"

Practical List for Power Point:

1. Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.
2. Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.
3. Create five Power Point slides detailing the process of internal assessment. It should be a self-running demo.

2. HTML Programming

- **Unit-I: Introduction** (1L)
- **Unit-II: The Basics** (2L)
 - The Head, the Body
 - Colors, Attributes
 - Lists, ordered and unordered
- **Unit-III: Links** (3L)
 - Introduction
 - Relative Links, Absolute Links
 - Link Attributes
 - Using the ID Attribute to Link Within a Document
- **Unit-IV: Images** (2L)
 - Putting an Image on a Page
 - Using Images as Links
 - Putting an Image in the Background
- **Unit V: – Tables** (4L)
 - Creating a Table

- Table Headers
- Captions
- Spanning Multiple Columns
- Styling Table
- **Unit VI – Forms** (3L)
 - Basic Input and Attributes
 - Other Kinds of Inputs
 - Styling forms with CSS
 - Where To Go From Here

Book Recommended:

1. Introduction to **HTML** and CSS -- O'Reilly , 2010
2. Jon Duckett, HTML and CSS, John Wiley, 2012

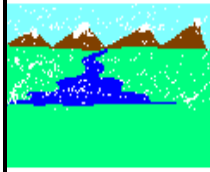
Software Lab Based on HTML:

Q.1 Create an HTML document with the following formatting options:

- I. Bold
- II. Italics
- III. Underline
- IV. Headings (Using H1 to H6 heading styles)
- V. Font (Type, Size and Color)
- VI. Background (Colored background/Image in background)
- VII. Paragraph
- VIII. Line Break
- IX. Horizontal Rule
- X. Pre tag

Q.2 Create an HTML document which consists of:

- I. Ordered List
- II. Unordered List
- III. Nested List
- IV. Image



XYZ Ltd's Update

1. Introduction
2. Company Financial Update
 - o First Quarter
 - o Second Quarter
 - o Third Quarter
 - o Fourth Quarter
3. Advertising Update
 - o Result of Newspaper Campaign
 - o Additions to staff
 - o New Thoughts on Television
4. Human Resources Update

- A. Safety Considerations
 1. Body substance isolation
 2. Sense safety
 3. Initial size-up
- B. Initial Patient Assessment
 1. General Impression
 2. Unresponsiveness
 - i. Alert to person, place and time
 - ii. Verbal response to audible stimuli
 - iii. Pain evokes verbal or physical response
 - iv. Unresponsive to all stimuli
- C. Patient Critical Needs
 1. Airway
 2. Breathing
 - i. Use oxygen if indicated
 - ii. Consider use of assisting with bag valve mask
 3. Circulation
 4. Bleeding

Q.3 Create an HTML document which implements Internal linking as well as External linking.

Q.4 Create a table using HTML which consists of columns for Roll No., Student's name and grade.

Result		
Roll No.	Name	Grade

Q.5 Create a Table with the following view:

			Place an image here	

Q.6 Create a form using HTML which has the following types of controls:

- I. Text Box
- II. Option/radio buttons
- III. Check boxes
- IV. Reset and Submit buttons

Subscribe to XYZ News Magazine and Emails

Interested in receiving daily small updates of all latest News? Well, now you can. And best of all, it is free! Just fill out this form and submit it by clicking the "send it In" button. We will put you on our mailing list and you will receive your first email in 3-5 days.

Please fill the following boxes to help us send the emails and our news letter:

First Name:

Last Name:

Business:

We must have a correct e-mail address to send you the news letter:

Email:

How did you hear about XYZ News Magazine and Emails?

☒ Here on the Web ☐ In a magazine ☐ Television ☐ Other

Would you like to be on our regular mailing list?

☒ Yes, we love junk emails

Q.7 Create HTML documents (having multiple frames) in the following three formats:

Frame1
Frame2

Frame1	
Frame2	Frame3

3. MySQL (SQL/PL-SQL)

(1+2 Lab)

SQL Vs. SQL * Plus:

SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus. (2L)

Managing Tables and Data:

- Creating and Altering Tables (Including constraints)
- Data Manipulation Command like Insert, update, delete
- SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE
- Join, Built in functions (4L)

Other Database Objects

- View
- Synonyms, Index (2L)

Transaction Control Statements

- Commit, Rollback, Savepoint (2L)

Introduction to PL/SQL

- SQL v/s PL/SQL
- PL/SQL Block Structure
- Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
- % TYPE and % ROWTYPE
- Using Cursor (Implicit, Explicit) (5L)

Books Recommended:

1. Baron Schwartz , High Performance MySQL, O'Reilly, 2012.
2. Vikram Vaswani , The Complete Reference MySQL , McGraw Hill Educations, 2004.

Software Lab Based on MySQL (SQL/PL-SQL):

[SQL COMMANDS]

- 1) SQL* formatting commands
- 2) To create a table, alter and drop table.
- 3) To perform select, update, insert and delete operation in a table.
- 4) To make use of different clauses viz where, group by, having, order by, union and intersection,
- 5) To study different constraints.

[SQL FUNCTION]

- 6) To use oracle function viz aggregate, numeric, conversion, string function.
- 7) To understand use and working with joins.
- 8) To make use of transaction control statement viz rollback, commit and save point.
- 9) To make views of a table.
- 10) To make indexes of a table.

[PL/SQL]

- 11) To understand working with PL/SQL
- 12) To implement Cursor on a table.
- 13) To implement trigger on a table

4. Multimedia Applications

Multimedia: Introduction to multimedia, Components, Uses of multimedia. (2L)

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools. (4L)

Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext. (2L)

Images: Still Images – Bitmaps, Vector Drawing, 3D Drawing & rendering, Natural Light & Colors, Computerized Colors, Color Palletes, Image File Formats. (3L)

Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats. (2L)

Video: How Video Works, Analog Video, Digital Video, Video File Formats, Video Shooting and Editing. (2L)

Animation: Principle of Animations. Animation Techniques, Animation File Formats. (2L)

Books Recommended:

1. Tay Vaughan, "Multimedia: Making it work", TMH, Eighth edition. 2006
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications Applications", Pearson, 1995.
3. Keyes, "Multimedia Handbook", TMH. 2000.
4. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, 2000

Software Lab Based on Multimedia (FLASH as a multimedia S/W):

Practical exercises based on concepts listed in theory using Flash.

FLASH: Concept of Frame, Key frames, Frame rate, Timeline, Tween, Layers, Symbols, Embedding audio/video and embedding on the web page

1. Draw an animation to show a bouncing ball.
2. Draw an animation to show a moving stick man.
3. Draw an animation to show a fainting banana.
4. Draw an animation to show sunrise and sunset.
5. Draw an animation to show a disappearing house.
6. Draw an animation to show two boats sailing in river
7. Draw an animation to show a scene of cricket match.
8. Draw an animation to help teach a poem or a song
9. Draw an animation to show cartoon with a message
10. Make a movie showing Shape Tweening.
11. Make a movie showing Motion Tweening.
12. Add sound and button to the movie

5. PHP Programming

(1 +2 Lab)

Introduction to PHP:

(3L)

- PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.)
- PHP with other technologies, scope of PHP
- Basic Syntax, PHP variables and constants
- Types of data in PHP, Expressions, scopes of a variable (local, global)
- PHP Operators : Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator.
- PHP operator Precedence and associativity

Handling HTML form with PHP:

(2L)

- Capturing Form Data
- GET and POST form methods
- Dealing with multi value fields
- Redirecting a form after submission

PHP conditional events and Loops:

(3L)

- PHP IF Else conditional statements (Nested IF and Else)
- Switch case, while ,For and Do While Loop
- Goto , Break ,Continue and exit

PHP Functions:

(3L)

- Function, Need of Function , declaration and calling of a function
- PHP Function with arguments, Default Arguments in Function
- Function argument with call by value, call by reference
- Scope of Function Global and Local

String Manipulation and Regular Expression:

(3L)

- Creating and accessing String , Searching & Replacing String
- Formatting, joining and splitting String , String Related Library functions
- Use and advantage of regular expression over inbuilt function
- Use of preg_match(), preg_replace(), preg_split() functions in regular expression

Array:

(3L)

- Anatomy of an Array ,Creating index based and Associative array ,Accessing array
- Looping with Index based array, with associative array using each() and foreach()
- Some useful Library function

Software Lab Based on PHP:

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.
Sample string : 'The quick " " brown fox'

Expected Output : Thequick""brownfox

9. Write a PHP script that finds out the sum of first n odd numbers.
10. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
11. Write a PHP script that checks if a string contains another string.
12. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.

13. Create a script to construct the following pattern, using nested for loop.

```
*  
* *  
* * *  
* * * *  
* * * * *
```

14. Write a simple PHP program to check that emails are valid.
15. WAP to print first n even numbers.
16. \$color = array('white', 'green', 'red')
Write a PHP script which will display the colors in the following way :
Output :
white, green, red,
- green
 - red
 - white
17. Using switch case and dropdown list display a “Hello” message depending on the language selected in drop down list.
18. Write a PHP program to print Fibonacci series using recursion.
19. Write a PHP script to replace the first 'the' of the following string with 'That'.

Sample : 'the quick brown fox jumps over the lazy dog.'

Expected Result : That quick brown fox jumps over the lazy dog.

6. Programming with VB/GAMBAS

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

(2L)

Controls : Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

(4L)

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data.

(2L)

Decision Making : If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

(4L)

Forms Handling : Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

(2L)

Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function.

(3L)

Book Recommended:

- a. Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh
(Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004))

Software Lab Based on Visual Basic:

Practical exercises based on concepts listed in theory using VB.

1. Write a VB application to compute the sum of two variables.
2. Write a VB application to compute the factorial of a number n.
3. Write a VB application to compute the Fibonacci series of a number n.
4. Write a VB application to compute the series of prime numbers till number n.
5. Write a VB application to compute the maximum of three numbers.
6. Write a VB application to compute the sum of odd numbers and even numbers in an array of n integers.
7. Write a VB application to compare the strings.
8. Write a VB application to make a calculator.
9. Write a VB application to choose your hobbies from a list.
10. Write a VB application to illustrate the use of color radio button.
11. Write a VB application to illustrate the use of color scroll bar form.
12. Write a VB application to illustrate the use of color scroll bar label text.
13. Write a VB application to illustrate the use of color text box.
14. Write a VB application to show a timer.

7. System Administration and Maintenance

(1+2 Labs)

Part I (Linux/Unix)

(8L)

- Basics of operating system, services,
- Installation and configuration, maintenance
- What is linux/unix Operating systems, Kernel, API, cli, gui,
- Difference between linux/unix and other operating systems
- Features and Architecture
- Linux features, advantages, disadvantages

Part II (Windows)

(8L)

- Windows as operating system, history, versions.
- PC hardware, BIOS, Devices and drivers,
- Kernel Configuration and building
- Application installation, configuration and maintenance
- Server services and Client services
- Difference between WindowsXP/windows7 and windows server 2003/2008

Software Lab Based on System Administration and Maintenance

Linux:

Linux Desktop tour. Configuring desktop environment and desktop settings.

Basic Commands :Terminal, shell,Cat, ls, cd, date, cal, man, echo, pwd, Mkdir, rm, rmdir Ps, kill
Package Installation Synaptic package manager

Windows:

<p>Creating users – Admin and regular.</p> <p>Path of their personal files. Adding and changing passwords.</p> <p>Difference between workgroup and domain. Concept of roles.</p> <p>user profiles – creating and roaming Concept of Active Directory. Creating active directory in windows 2003/2008.</p>
<p>Process and Disk management</p> <p>Windows Task manager. File systems – NTFS, FAT.</p>
<p>Services</p> <p>Control Panel</p> <p>C:/program Files, C:/system C:/windows</p> <p>Add /remove new hardware (like printer), Add/remove new programmes.</p>
<p>Network Administration</p> <p>Ipconfig,Ping, tracert, route, hostname, net, netstat, whoami</p> <p>Set manual IP address, check connectivity – ipv4, ipv6</p>
<p>Administrator Tools</p> <p>Control Panel -> Administrative Tools</p> <p>Computer Management, Local security Policy, Performance Monitor, Task Scheduler, Antivirus and firewall.</p>
<p>Misc</p> <p>Start->Accessories->System tools -> All options (Remote desktop, backup/restore etc.)</p> <p>LAN – sharing printer, files and folder over the network.</p>

8. Programming with SCILAB (1+2Labs)

Unit I- Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy. (2L)

Unit II- Programming Environment: SCILAB Environment, Workspace, Working Directory, Expressions, Constants, Variables and assignment statement, Arrays. (3L)

Unit III- Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save. (2L)

Unit IV- Matrices and Some Simple Matrix Operations, Sub- Matrices. (2L)

Unit IV- Procedures and Functions: Arguments and return values, (2L)

Unit V-Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop. (3L)

Unit VI- Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list. (2L)

Recommended Books:

1. M.Affouf, SCILAB by Example , CreateSpace Independent Publishing Platform,2012
2. H. Ramchandran, A.S. Nair, SCILAB , S.Chand, 2011

Software Lab Based on SCILAB:

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
 - a. $(3+4)/(5+6)$
 - b. $2\pi^2$
 - c. $\sqrt{2}$
 - d. $(0.0000123 + 5.67 \times 10^{-3}) \times 0.4567 \times 10^{-4}$
2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
 - a. 2, 4, 6, 8, 10
 - b. 1/2, 1, 3/2, 2, 5/2
 - c. 1, 1/2, 1/3, 1/4, 1/5
 - d. 1, 1/4, 1/9, 1/16, 1/25
4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2 ,0.5, 1.3] ; while the numbers of each product are [3, 2 ,1 ,5]. Use MATLAB to calculate the total bill.

5. The `sortrows(x)` function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
6. The “identity” matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the `eye()` function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix $A = \begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix}$ the identity matrix $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is generated. That is $A*B=I$.
7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,...,√Nth entries, i.e. those numbers which have indices that are square numbers.
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates :

$$r_n = \sqrt{n}$$

$$\theta_n = \frac{137.51}{180} \pi n$$

10. Calculate 10 approximate points from the function $y=2x$ by using the formulae:
 - i. $x_n = n$
 - ii. $y_n = 2n + \text{rand} - 0.5$
 Fit a line of best fit to these points using the function `polyfit()` with `degree=1`, and generate co-ordinates from the line of best fit using `polyval()`. Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.
11. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.
12. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.
13. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.
14. Write a function called `FtoC` (`ftoc.m`) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
 - i. `FtoC(96)`
 - ii. `lookfor Fahrenheit`
 - iii. `help FtoC`
15. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
 - i. Enter string 1: Mark
 - ii. Enter string 2: Huckvale
 - iii. Mark Huckvale
 - iv. *****
 - v. elavkcuH kraM

9. Concepts of Software Testing

(1+2 Labs)

Introduction

(4L)

Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System Testing, Basic Terminologies, V Shaped Software Lifecycle Model

Functional Testing\ Black-box Testing

(5L)

Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing

Structural Testing\ White-box Testing

(6L)

Basis Path Testing: Program Graph, DD Path graph, Cyclomatic Complexity, Graph Matrices, Control Flow Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage

Books Recommended:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Seventh Edition, Mc Graw Hill Education.2009.
2. Yogesh Singh, Software Testing, Cambridge University Press,2011.

Computer Lab Based on Software Testing:

1. Write a program that take three inputs (a,b &c) that represent the sides of a triangle, and the output is one of the below four:
 - a. Not a triangle
 - b. Scalene triangle
 - c. Isosceles triangle
 - d. Equilateral triangle
 - 1.1 Generate test cases using Boundary Value Analysis, Equivalence Class Partitioning and Decision Table Testing.
 - 1.2 Generate test cases using Basis path testing.
 - 1.3 Run code coverage tool.
2. Write a program that determines the nature of roots of a quadratic equation. Output should be one of the following:-
 - Not a quadratic equation.
 - Complex roots
 - Real roots
 - Single roots
 - I. Generate test cases using Boundary Value Analysis, Equivalence Class Partitioning and Decision Table Testing.
 - II. Generate test cases using Basis path testing.
 - III. Run code coverage tool
3. Write a program that checks whether the number is even or odd. Run code coverage tool and find the amount of code being covered.

4. Write a program that dynamically allocates memory to 10 integers using malloc() or calloc() and
 - do not free memory leading to memory leaks. Verify the same using Valgrind.
 - Now, free memory using free() at the end of the program to avoid memory leaks. Verify the same using Valgrind.
5. Use LoadUI load testing tool to test the web application performance.

10. Android Programming

Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. (2L)

Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine. (4L)

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating an Android project – Hello Word, run on emulator, Deploy it on USB-connected Android device. (5L)

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes. (2L)

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, and Dialog. (2L)

Database: Understanding of SQLite database, connecting with the database. (2L)

Book Recommended:

1. Android application development for Java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

ONLINE READING / SUPPORTING MATERIAL:

1. <http://www.developer.android.com>
2. <http://developer.android.com/about/versions/index.html>
3. <http://developer.android.com/training/basics/firstapp/index.html>
4. <http://docs.oracle.com/javase/tutorial/index.htm> (Available in the form of free downloadable ebooks also).
5. <http://developer.android.com/guide/components/activities.html>
6. <http://developer.android.com/guide/components/fundamentals.html>

7. <http://developer.android.com/guide/components/intents-filters.html>.
8. <http://developer.android.com/training/multiscreen/screensizes.html>
9. <http://developer.android.com/guide/topics/ui/controls.html>
10. <http://developer.android.com/guide/topics/ui/declaring-layout.html>
11. <http://developer.android.com/training/basics/data-storage/databases.html>

Software Lab Based on Android Programming:

1. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the emulator. Also display “Hello World” in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

11.XML Programming

Introduction: Understanding Mark-up Languages, Introduction to XML and its Goals. (3L)

XML Basics: XML Structure and Syntax, Document classes and Rules. (5L)

Other XML Concepts: Scripting XML, XML as Data, Linking with XML. (4L)

XML with Style: XSL –Style Sheet Basics, XSL basics, XSL style sheets. (3L)

Books Recommended

1. William J. Pardi , XML in action web technology, Microsoft Press, 1999
2. Michael J. Young ,Step by Step XML , Microsoft Press, 2002

Software Lab Based on XML:

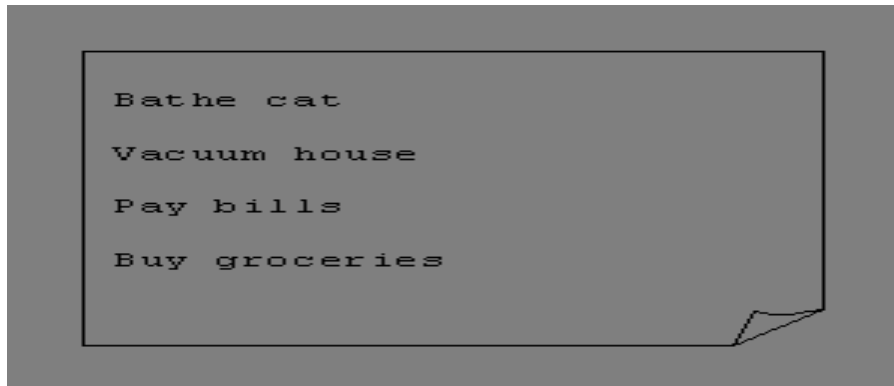
Exercise #1 – Information Structure

In this exercise, student will practice identifying the structure of an information object.

For the sample document provided below:

Label the information structures you see, including containing structures.

12. Draw a tree representation of the structure.



Exercise 2# Deconstructing an XML Document

In this exercise, student will practice identifying the explicit structure within an XML document. In a sense, this is the reverse of what you did in Exercise #1. For the sample XML markup below, create a document-like representation (or a simple drawing) for the content contained within the XML tags:

```
<book>
```

```
<coverInfo>
```

```
  <title>The XML Handbook</title>
```

```
  <author>Charles F. Goldfarb</author>
```

```
  <author>Paul Prescod</author>
```

```
  <edition>Second</edition>
```

```
<description>The definitive XML resource: applications, products, and technologies. Revised  
and expanded—over 600 new pages.
```

```
</description>
```

```
</coverInfo>
```

```
</book>
```

Exercise #3 – Creating XML Markup

In this exercise, create some XML markup based on the tree representation from Exercise #1 above, and the content from the original sample document.

Exercise #4 – Well-Formedness

This exercise checks your understanding of the constraints for well-formedness. Are the following document instances well-formed? Explain any NO answers.

```
<list><title>The first list</title><item>An item</list>
```

```
<item>An item</item><item>Another item</item>
```

```
<para>Bathing a cat is a <emph>relatively</emph> easy task as long as the cat is  
willing.</para>
```

```
<bibl><title>How to Bathe a Cat<author></title>Merlin Bauer<author></bibl>
```

Exercise #5-Well Formedness

This exercise is a bit more challenging than the previous example. Here is a fragment of an XML document instance. Identify all the places where it fails to match the constraints for well-formedness.

<PROCEDURE><TITLE>How to Bathe a Cat</TITLE>

<OVERVIEW>

This procedure tells you how to bathe a cat. <WARNING></OVERVIEW>Cats don't like to take baths. You could get hurt doing this. Be sure to obtain all the required protective gear before you start. </WARNING><EQUIPEMENT><ITEM>Hockey Mask <ITEM>Padded Full-body Kevlar Armor</ITEM><ITEM>Tub full of warm water</ITEM><ITEM>Towels</ITEM><ITEM>First Aid kit</ITEM><ITEM>Cat Shampoo</ITEM><EQUIPEMENT><INSTRUCTIONS> <STEP> Locate the cat, who by now is hiding under the bed.</STEP><STEP>Place the cat in the tub of water.</STEP> <ITEM>Using the First Aid kit, repair the damage to your head and arms.</STEP> <STEP>Place the cat back in the tub and hold it down.</STEP> <STEP>Wash it really fast, then make an effort to dry it with the towels.</STEP> <STEP>Decide not to do this again. </STEP> </INSTRUCTIONS>

Note: Cover more exercises based on XML Programming theory concepts.

12.R-Programming

(1+2 Labs)

Introduction: Overview and History of R, Getting Help, Data Types, Subsetting, Vectorized Operations, Reading and Writing Data. (5L)

Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards. (5L)

Scoping Rules, Debugging Tools, Simulation, R Profiler.

Reference Book

W. N. Venables, D. M. Smith, An Introduction to R, R-core team,2015

(5L)

Software Lab Based on R Programming:

1. Write a program that prints 'Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition , subtraction and Multiplication